Empowering Ag Professionals through a Beneficial and Pest Insect Train the Trainer

Course Description

Monday May 3

8:00-9:00 AM  Introduction to Insects and Basic Morphology (Rondon)
9:00-9:15 AM  Break
9:15-11:15 AM  Taxonomy and Use of Identification Keys (Marshall)
11:15-11:30AM Break
11:30-12:30 AM Orders of Insects I. (Arthropoda – Orthopteroid Orders (Marshall)
12:30-1:00 PM  Lunch Break (Lunch will be provided)
1:00-2:30 PM   Orders II. Hemiptera & Holometabola 1 (Marshall)
2:30-2:45 PM  Break
2:45-3:45 PM   Orders III. Holometabola 2 (Marshall)
3:45-5:00 PM   Insect Collection Tips (Marshall-Rondon)

**Introduction to Insects and Basic Morphology (Instructor, S.I. Rondon)**

Morphology
- General Morphology
- Head
- Thorax

Systematic and Taxonomy
Systematics: Study of the diversity and relationships among organisms
Taxonomy: (A part of systematics) The process of classifying and naming
Phylogenetic relationships: based on evolutionary sequences and relationships among groups.

**Taxonomy and Use of Identification Keys (Instructor, C. Marshall)**

Hierarchy of categories used in classification -Linnaeus
- Kingdom
- Phylum (and subphylum)
- Class (and subclass)
- Order (and suborder)
- (Superfamily)
- Family (and subfamily)
- (Tribe)
- Genus (and subgenus)
- Species (and subspecies)

Phylum Arthropoda
- Characteristics of the Phylum Arthropoda
Classification of the Arthropods

Key to the Arthropoda.  **(Focus: Agronomic Importance – in bold)**

**Subphyla:**
- **Trilobita** - the Trilobites (fossils only)
- **Chelicerata** - no antennae; the first pair of appendages are chelicerae (involved in food handling); 2 distinct body regions -- cephalothorax and abdomen
  
  Classes include:
  - Merostomata -- horseshoe crabs
  - **Arachnida** -- scorpions, spiders, harvestmen, mites & ticks, and pseudoscorpions
  - Pycnogonida -- sea spiders
  - Crustacea -- 2 pairs of antennae; most appendages end in a 2-branched segment ("biramous")
    
    Classes include:
    - Branchiopoda -- fairy shrimp
    - Copepoda -- copepods (Cyclops)
    - Cirripedia -- barnacles
    - Malacostraca -- lobsters, crayfish, crabs, shrimp, isopods (sowbugs or pillbugs)

- **Atelocerata** - single pair of antennae, unbranched appendages, unique structure of mandibles (in comparison with the Chelicerata)
  
  Classes include:
  - Diplopoda -- millipedes
  - Chilopoda -- centipedes
  - Pauropoda -- paurapods
  - Symphyla -- symphylans
  - **Hexapoda** -- insects

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**Orders of Insects (Focus: Agronomic Importance – in bold)**

Order Protura – “proturans”
Order Diplura--“Two-pronged Bristletails”
**Order Collembola--“Spingtails”**
Order Archaeognatha (Microcoryphia)
Order Zygentoma (=Thysanura)
Order Ephemeroptera--“Bristletails”
Order Odonata--“Dragonflies”
Order Grylloblattodea -
Order Phasmida – “Stick and Leaf Insects”
**Order Orthoptera-- “Crickets, Grasshoppers and Locusts”**
Order Mantodea--“Praying mantids”
Order Blattaria--“Roaches”
**Order Isoptera-- “Termites”**
Order Dermaptera--“Earwins”
Order Embiidina—“Web-spinners”
Order Plecoptera—“Stone flies”
Order Zoraptera
**Order Psocodea** (now includes *Psocoptera* AND *Pthiraptera*)—“Psocids or Booklice”
**Order Hemiptera** (now includes the groups historically included in ‘Homoptera’)
**Order Thysanoptera**—“thrips”
Order Raphidioptera
Order Megaloptera
Order Neuroptera—“Alder Flies, Snake Flies and Lacewings”
**Order Coleoptera**—“Beetles”
Order Mecoptera—“Scorpion Flies”
Order Siphonaptera—“Fleas”
**Order Lepidoptera**—Butterflies and Moths”
Order Trichoptera—“Caddis Flies”
**Order Diptera**—“True Flies”
**Order Hymenoptera**—“Bees, Wasps and Ants”

Insect Collection Tips (Instructor, C. Marshal)

Collection criteria for your required collection

Techniques
- Collecting and Preserving Insects and Mites: Tools and Techniques
- Mounting and Preserving Insects - from Expand the World
- Insect Collecting Tips
- How to use a microscope

**Tuesday - May 4**

7:00-11:00 AM  Field Trip (Marshall - Rondon)
11:00-12:30 PM  Back to Classroom
12:30-1:00 PM  Lunch Break (Lunch will be provided)
1:00-2:30 PM  Continue Order of Insects
2:30-3:45 PM  Organize individual collections (*i.e.*, mounting, using insect identification keys)
3:45-5:00 PM  Insect Ecology

**Insect Ecology (Instructor, S.I. Rondon)**

Ecology and Biology
- Temperature, Water and Humidity
- Seasonal Adaptation - Diapause And Dormancy
- Seasonal Adaptation – Migration
- Insect Behavior
Wednesday - May 5

8:00-9:00 AM Where to find information about insects
9:00-9:15 AM Break
9:15-11:15 AM How to manage insects using Integrated Pest Management Strategies
11:15-11:30 AM Break
11:30-12:30 AM Organizing individual collections (i.e. mounting, using insect Id keys)
Adjourn

Where to Find Information About Insects (Instructor, S.I. Rondon)

Regional
Oregon State Arthropod Collection [http://osac.science.oregonstate.edu/](http://osac.science.oregonstate.edu/)
Oregon State Plant Clinic [http://www.science.oregonstate.edu/bpp/Plant_Clinic/index.htm](http://www.science.oregonstate.edu/bpp/Plant_Clinic/index.htm)
HAREC-OSU Lab [http://cropandsoil.oregonstate.edu/entomology_lab/index.htm](http://cropandsoil.oregonstate.edu/entomology_lab/index.htm);
[http://entomology.oregonstate.edu/personnel/rondon-silvia](http://entomology.oregonstate.edu/personnel/rondon-silvia)
[http://cropandsoil.oregonstate.edu/people/Rondon-Silvia](http://cropandsoil.oregonstate.edu/people/Rondon-Silvia)
[http://oregonstate.edu/dept/hermiston/](http://oregonstate.edu/dept/hermiston/)
[http://oregonstate.edu/potatoes/ipm/index.htm](http://oregonstate.edu/potatoes/ipm/index.htm)

National and International

How to Manage Insects Using Integrated Pest Management Strategies

- Methods of Control. i.e. Cultural, Mechanical, Physical, Biological, and Chemical practices
- Integrating Biological Control and Chemical Control

Participants are welcome to work “extra hours” if desired at the Hermiston Entomology Lab to complete their collections. A signup sheet will be available for times and lab availability.